Income-Based Drug Coverage in British Columbia: The Impact on Access to Medicines

Un régime d'assurance-médicaments fondé sur le revenu en Colombie-Britannique : Incidence sur l'accès aux médicaments

by PATRICIA A. CAETANO, PHD
Post-doctoral Fellow, Centre for Health Services and Policy Research
University of British Columbia, Vancouver, BC

COLETTE B. RAYMOND, PHARMD
WRTC/CHSPR Research Intern,
Centre for Health Services and Policy Research
University of British Columbia, Vancouver, BC

STEVE MORGAN, PHD
Assistant Professor, Department of Health Care and Epidemiology,
and Centre for Health Services and Policy Research
University of British Columbia, Vancouver, BC

LIXIANG YAN, MSC
Programmer/analyst, Centre for Health Services and Policy Research
University of British Columbia, Vancouver, BC

Abstract

Background and Objectives: In May 2003, the government of British Columbia adopted income-based pharmacare, replacing an age-based program. Stated policy goals included the maintenance or enhancement of access to necessary medicines. This study examines the policy impact on access to two widely used drugs for chronic risk factors (antihypertensives and statins).

Methods: Data on incident antihypertensive and statin prescriptions between 1997 and 2004 were extracted from PharmaNet. Incident antihypertensive users were those who filled a first prescription after residing in the province for at least two years prior to the initial prescription date. The number of patients who ceased to fill a contiguous series of prescriptions (within 120 days of one another) was used as a measure of apparent discontinuation or interruption of therapy. We used time series analysis to test for changes in incident use and discontinuation.

Results: Between 1997 and 2004, 530,167 BC residents initiated therapy with an antihypertensive, and 264,904 BC residents initiated therapy with a statin. The 2003 policy change had no statistically significant impact on incident use of antihypertensives or statins, when stratified by age or income. Similarly, the 2003 policy did not change the rate of apparent discontinuations of therapy across age and income groups. However, a co-payment introduced in 2002 did increase end-of-year seasonality in apparent discontinuations in seniors – a finding that deserves further research.

Discussion: The 2003 transition to income-based pharmacare in British Columbia did not result in significant changes in access to, or continuation of, prescriptions to treat two leading chronic risk factors.

Résumé

Contexte et objectifs : En mai 2003, le gouvernement de la Colombie-Britannique a instauré un régime d'assurance-médicaments fondé sur le revenu pour remplacer un régime fondé sur l'âge. Parmi les objectifs visés, mentionnons le maintien ou l'amélioration de l'accès aux médicaments essentiels. Cette étude examine l'incidence de la politique sur l'accès à deux types de médicaments couramment utilisés pour traiter des facteurs de risque chroniques (les antihypertenseurs et les statines).

Méthodes : On a puisé dans PharmaNet et extrait les données sur les ordonnances d'antihypertenseurs et de statines entre 1997 et 2004. Les utilisateurs ponctuels d'antihypertenseurs étaient ceux qui ont obtenu une première ordonnance après avoir résidé dans la province pendant au moins deux ans avant la date initiale de l'ordonnance. On a utilisé le nombre de patients qui ont cessé de faire exécuter une série contiguë d'ordonnances (à 120 jours d'intervalle ou moins les unes des autres) pour déterminer la cessation ou l'interruption apparente du traitement. Nous avons eu recours à l'analyse des séries chronologiques pour vérifier les changements dans

l'utilisation ponctuelle et la cessation du traitement.

Résultats : Entre 1997 et 2004, 530 167 résidents de la C.-B. ont entamé un traitement avec un antihypertenseur et 264 904 en ont entamé un avec une statine. Les changements apportés à la politique en 2003 n'ont pas eu une incidence statistiquement importante sur l'utilisation ponctuelle des antihypertenseurs ou des statines lorsqu'on les stratifie selon l'âge ou le revenu. De même, la politique de 2003 n'a pas modifié le taux de cessations apparentes du traitement pour les divers groupes d'âge ou niveaux de revenu. Cependant, une quote-part instaurée en 2002 a eu pour effet d'augmenter les fluctuations saisonnières de fin d'année dans les cessations apparentes chez les aînés – une constatation qui mérite d'être examinée de plus près.

Discussion : L'adoption, en 2003, d'un régime d'assurance-médicaments fondé sur le revenu en Colombie-Britannique n'a pas entraîné de changements significatifs à l'accès aux médicaments ou à l'exécution ininterrompue d'ordonnances visant à traiter deux facteurs de risque chroniques.

———

IN RESPONSE TO FINANCIAL PRESSURES AND THE PERCEIVED INEQUITY OF AGE-based subsidies, the British Columbia BC PharmaCare Program recently underwent a major transformation. BC PharmaCare circa 2001 could be characterized as a "mixed pharmacare model," involving relatively comprehensive coverage for social assistance recipients and seniors, and fixed-deductible coverage for catastrophic drug costs for all others. In January 2002, the BC Ministry of Health introduced temporary co-payments under the seniors' drug program. Then, in May 2003, the fixed-deductible catastrophic program and the seniors' program were combined into a new, income-based drug plan called Fair PharmaCare. Details of the policy change and the policy objectives that motivated it are provided in an accompanying paper (Morgan and Coombes, page 92). By creating an income-based drug benefits program – Fair PharmaCare – policy makers sought to improve, or at least maintain, access to prescription medicines for individuals of all ages and incomes. In this paper, we examine potential changes in access to medicines before and after the policy transformation.

Policy-related changes in access to prescription medicines can be measured by quantifying and comparing the proportion of the population that was dispensed medication before and after the policy change (Tamblyn 2001; Schneeweiss et al. 2002a,b). In particular, studying the utilization of medicines that are (1) prescribed commonly, (2) used over long periods and (3) indicated for subclinical risk factors (and thereby more likely to be sensitive to cost-related non-adherence) will identify potentially beneficial or adverse impacts of policy change at the population level. Medications for hypercholesterolemia and hypertension are excellent candidates for such analyses

– they are widely prescribed and ideally should be taken continuously for long periods (Genest et al. 2003; Khan et al. 2005). Moreover, rates of adherence with such treatments have been widely studied, establishing an empirical framework for measuring treatment persistence (Caro et al. 1999; Jackevicius et al. 2002; Morgan and Yan 2004). We therefore examined drug utilization patterns before and after the May 2003 policy change, using population-based, person-specific prescription drug data for 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors (statins) and antihypertensives (including angiotensin-converting enzyme [ACE] inhibitors, angiotensin-II receptor blockers [ARBs], β-blockers, calcium channel blockers [CCBs], alpha antagonists, thiazide diuretics, non-thiazide diuretics and other antihypertensives [e.g., reserpine]).

Methods

We performed a longitudinal analysis of prescription claim records for antihypertensives and statins for the adult population (19 years of age and over) of British Columbia from January 1, 1996 through December 31, 2004. Data describing prescription drug utilization were extracted from the British Columbia PharmaNet system; demographic information was assembled from the British Columbia Linked Health Database (Morgan and Yan 2006). Because the changes to BC PharmaCare affected seniors and non-seniors differently and affected households of varying income levels differently, analyses were stratified by senior status (i.e., seniors [>65 years] versus non-seniors [<65 years]) and by income. Age was calculated at the date that a patient initiated treatment with the specific class of medicines. Income strata were derived from the 2001 Canadian Census, based on median neighbourhood income (Morgan and Yan 2006). To determine the policy impact on seniors living alone, separate analyses were conducted comparing seniors living in single-person and multi-person households.

The incidence of newly treated patients and the number of individuals discontinuing treatment were calculated for each month from January 1997 through December 2004. Incident drug use was defined as the first time a patient received a prescription for an antihypertensive or statin following at least one year without prior use of such medicines. Patients were not counted as incident users if they had initiated therapy, stopped and then started again; therefore, all individuals who received antihypertensive or statin prescriptions in 1996 were excluded from the analyses. Antihypertensive users were required to be continuously enrolled in the provincial health insurance plan for at least two years prior to their first prescription, whereas statin users required three years of registration.[1] Only individuals registered with the provincial health insurance plan for at least one year after their incident prescription were included in the analysis of discontinuations. Denominators for the incidence rate calculations were adjusted for these residency requirements.

If more than 120 days had elapsed before an individual refilled a prescription for an antihypertensive or statin, he or she was considered to have discontinued treatment, if only temporarily. The 120-day interval was chosen to be consistent with prior studies (Jackevicius et al. 2002; Morgan and Yan 2004) and because 100 days is the official limit on days supplied in British Columbia. Changes from one type of antihypertensive or statin to another were not considered discontinuations. If a gap of more than 120 days occurred between filled prescriptions for any drug within the appropriate class, the date on which the individual was dispensed his or her last prescription in a series of "continuous" prescriptions was considered the date of discontinuation.

In addition to visually assessing the graphs of monthly incidence and discontinuation throughout the study period, we conducted time-series analysis to identify potentially significant changes in incident use and discontinuation rates following the policy changes in both 2002 and 2003. Two approaches were taken, each with the same result. First, using SAS/ETS (SAS Institute, Cary, NC), we computed standard linear time-series models for each access measure and each population substratum. The linear model included dummy variables for monthly seasonal effects and variables to test for change in intercept and trend at the implementation of the seniors' co-payment in January 2002 and Fair PharmaCare in May 2003. Over 120 models were computed, with stepwise specification of the autoregressive component of errors. Other time-series forecasting models were specified for each access measure and for key population substrata (seniors/non-seniors by lowest/median/highest income). These time-series forecasting models were fitted using SAS/ETS on data from January 1997 to April 2003. Models included ARIMA, seasonal exponential smoothing, log smoothing and others. Best fits were selected by SAS/ETS for each analysis. Projections and 95% confidence intervals were obtained for May 2003 through December 2004.

Results

Incidence (initiation) rates

Over the study period, 530,167 adults who met our inclusion criteria initiated therapy with an antihypertensive and 264,904 with a statin; a majority of both cohorts were non-seniors (65% of antihypertensive users, 58% of statin users).

Monthly incidence of antihypertensive use (Figure 1A) generally declined over the study period. For non-seniors, incidence rates decreased from 2.1 per 1,000 at the beginning of 1997 to 1.7 per 1,000 at the end of 2004 (*P*-trend, 0.12). For seniors, incidence rates significantly decreased from 5.2 to 2.9 per 1,000 over the same period (*P*-trend, <0.001). After adjusting for these trends, there were no significant changes

in the incidence rates of antihypertensive therapy post-policy among seniors (P=0.42) or non-seniors (P=0.64).
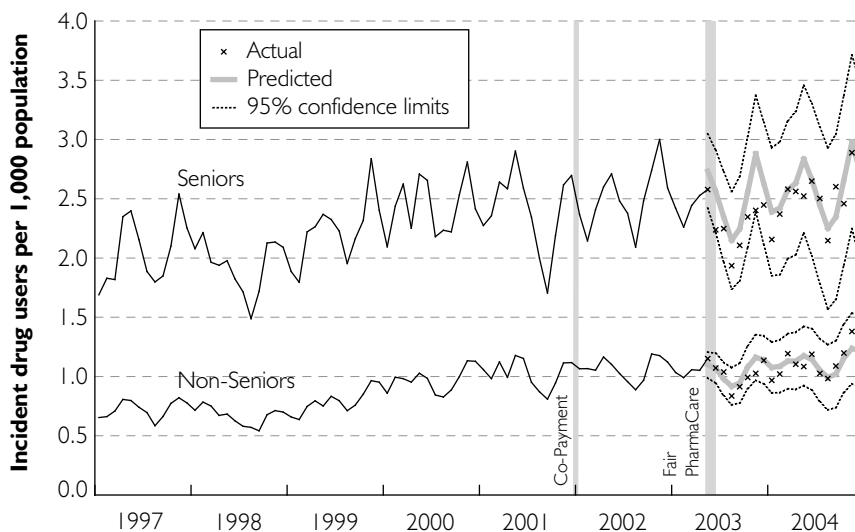
Statin utilization, on the other hand, increased significantly from the beginning of 1997 through the end of 2004: from 0.7 to 1.3 per 1,000 non-seniors per month, and

FIGURE 1. Monthly incidence of antihypertensive use (A) and statins (B), by age category, 1997–2004
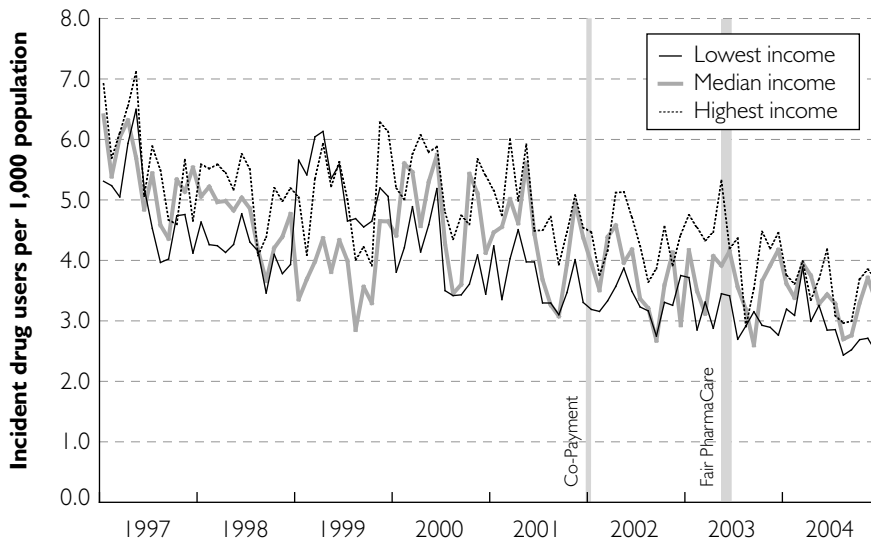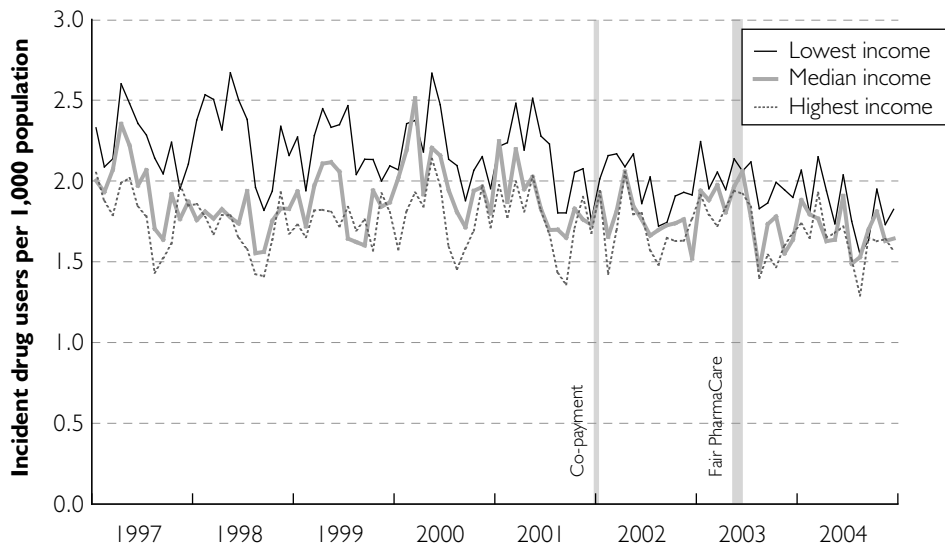
A: Antihypertensives
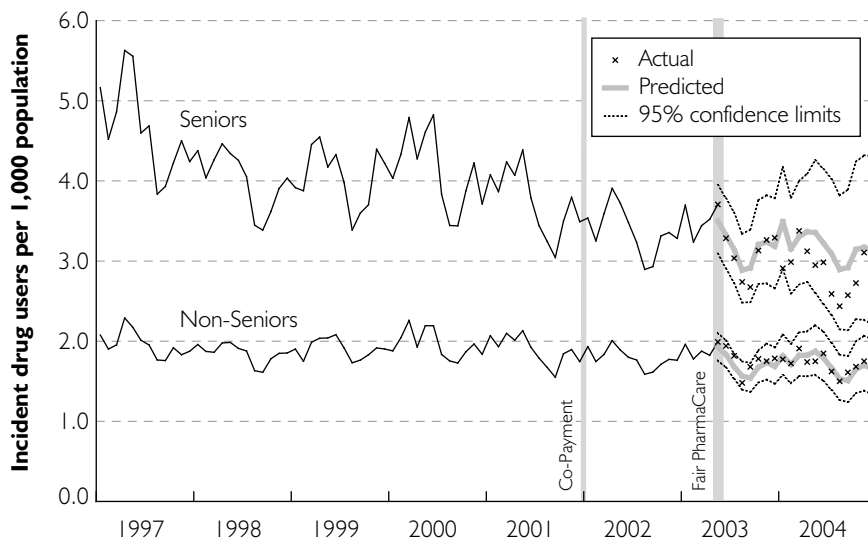
B: Statins

from 1.7 to 2.7 per 1,000 seniors per month (*P*-trend, <0.001). As with antihypertensives, observed statin incidence after the policy changes did not significantly differ from that predicted using the pre-policy data among seniors or non-seniors (Figure 1B).

FIGURE 2. Monthly incidence of antihypertensive use in seniors (A) and non-seniors (B) by income, 1997–2004

A: Seniors (≥65 years)

B: Non-seniors (<65 years)

Figures 2 and 3 illustrate the analyses of incident utilization of antihypertensives and statins, respectively, stratified by both age and income. For parsimony, the figures illustrate the monthly rates of incident antihypertensive and statin use for the highest

FIGURE 3. Monthly incidence of statin use in seniors (A) and non-seniors (B) by income, 1997–2004
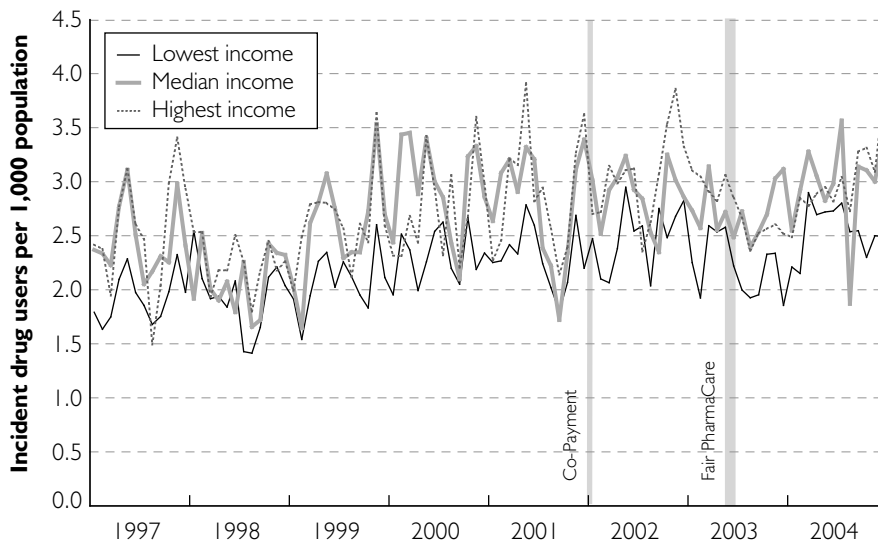
A: Seniors (≥65 years)

B: Non-seniors (<65 years)
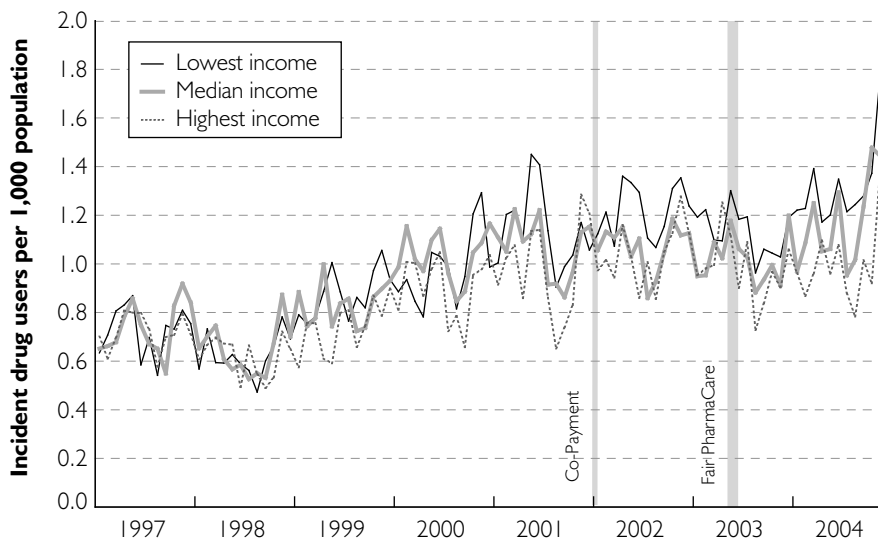
income decile, the middle income decile and the lowest income decile; results for all other income deciles were similar. Time series analyses revealed no statistically significant differences ($P \geq 0.05$ in all age and income strata) between observed and predicted incidence after Fair PharmaCare implementation.

Discontinuation rates

The rate at which seniors and non-seniors appeared to discontinue antihypertensive treatment declined over the entire study period (Figure 4). There was no discernable change in the rate at which seniors or non-seniors discontinued therapy after the introduction of Fair PharmaCare in either drug class ($P \geq 0.05$ for both drug classes and age groups). However, the rate at which seniors appeared to discontinue therapy according to the definitions used in this study increased in both drug classes just prior to the January 2002 policy change and prior to the May 2003 policy change. By the end of 2003, cyclicality in the measure of seniors' discontinuation rates mirrored that of non-seniors. This end-of-year spike in apparent discontinuation was not observed among seniors prior to the 2002 policy change.

Discontinuation rates for individuals stratified by age and income are illustrated in Figure 5 and Figure 6. (While three strata are illustrated for parsimony, results for all other income strata are similar.) For both drug categories, discontinuations varied by income strata, with the greatest number of discontinuations generally among those in the lowest income deciles. No significant increase in the monthly rate of discontinuation across age group or income strata was observed following the implementation of Fair PharmaCare ($P \geq 0.05$ for all ages, incomes and combinations thereof).

Finally, we determined whether the potential impact of the policy change might have differed for seniors who live in multi-person versus single-person households. Access was measured according to the methods described above, with incidence measured in terms of the number of new users per month. The results of the trends in treatment initiations (illustrated in Appendix 1), and the time-series statistical analyses conducted on them, indicate the policy did not have a statistically significant impact on initiations of therapy for seniors of differing income levels, living in either single- or multi-person households. Similarly, we found that Fair PharmaCare had no impact on trends in apparent treatment discontinuations by seniors in multi-person or single-person households (results not shown).

Discussion

The Fair PharmaCare Program sought to maintain access to prescription medicines irrespective of age or income. We assessed the potential impact of the policy change on the population's use of a variety of treatments for hypertension and high cholesterol. We did

not detect statistically significant changes in access as measured by the rate of treatment initiation for these two widely prescribed therapeutic categories. Because our analyses were stratified into cohorts (based on age and income) that were affected differently by

FIGURE 4. Monthly discontinuation rates for antihypertensives (A) and statins (B) by age group, 1999–2004
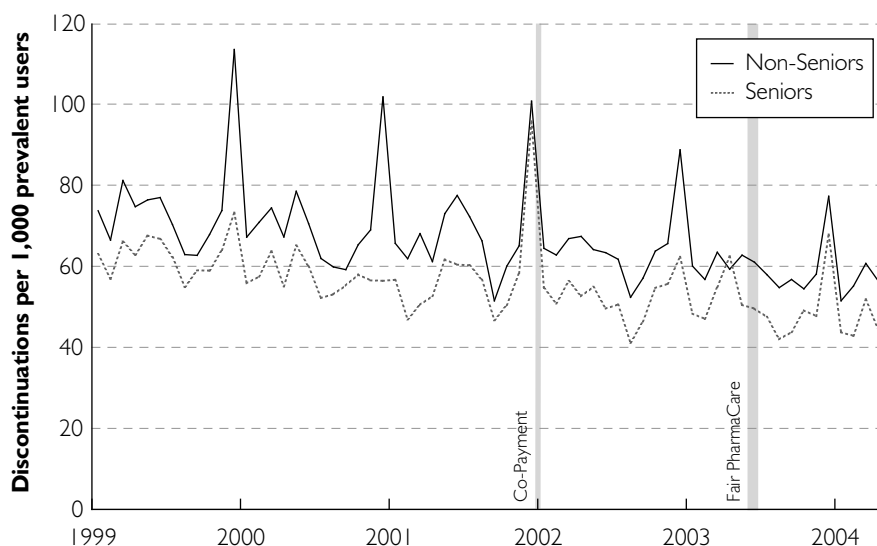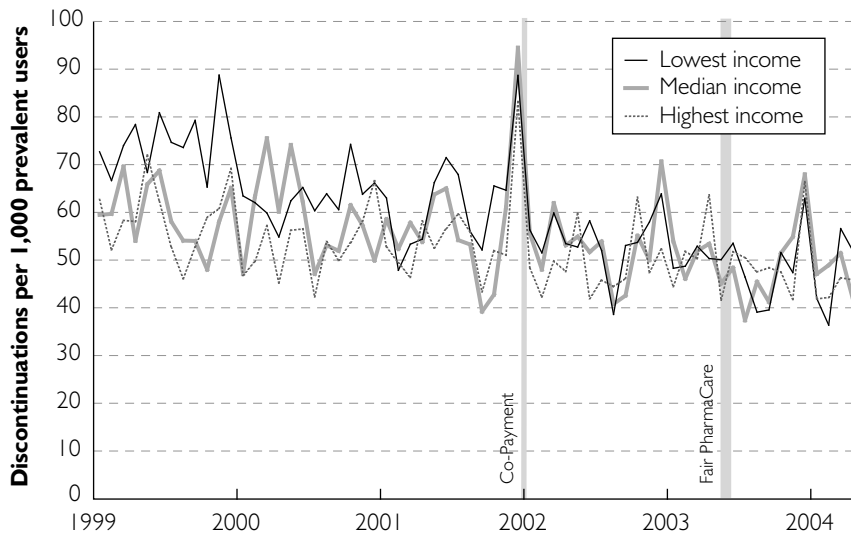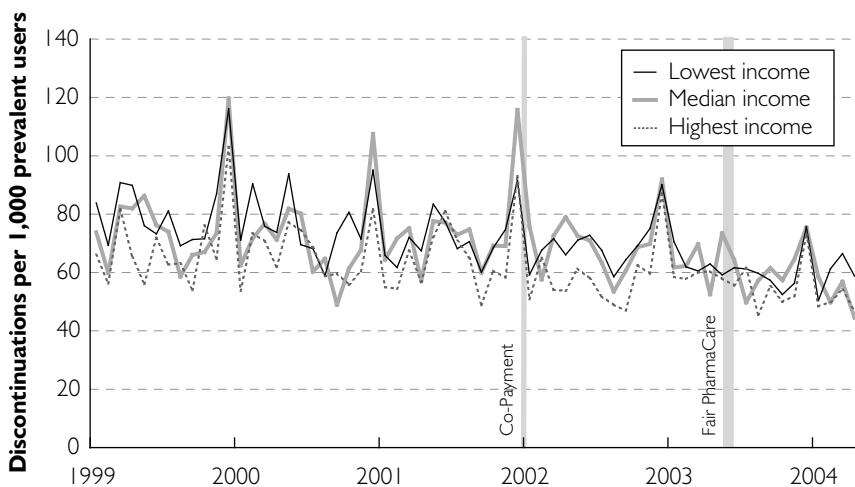
A: Antihypertensives

B: Statins

FIGURE 5. Statin discontinuation rates in seniors (A) and non-seniors (B) by income, 1999–2004

A: Seniors (≥65 years)

B: Non-seniors (<65 years)

the implementation of Fair PharmaCare, and because the findings were consistent across strata, our finding is unlikely to be driven by factors exogenous to the policy change.

However, the results of the present study do demonstrate a statistically significant increase in the number of seniors who appear to have discontinued therapy just prior to the introduction of the 2002 policy change, as well as a change in seasonality for

the measured rates of seniors' discontinuation of therapy. These changes in seasonal rates of apparent discontinuation likely reflect patients' behavioural responses to the introduction of new charges under the seniors' drug plan. Specifically, with the antici-

FIGURE 6. Discontinuation rates of antihypertensive drugs in seniors (A) and non-seniors (B) by income, 1999–2004

A: Seniors (≥65 years)

B: Non-seniors (<65 years)

pated increase in costs per prescription filled in January 2002 and again in May 2003, many seniors who regularly receive medicines for chronic conditions may have filled more than 120 days worth of prescriptions in December 2001 and April 2002. This stockpiling of medicines deserves further investigation to determine whether it generates clinically relevant outcomes. Non-seniors, many of whom are insured through private drug plans with annual deductibles, have long exhibited high rates of apparent end-of-year discontinuation of therapy.

Some potential limitations of this analysis should be noted. Firstly, the utilization patterns of only two medication groups were analyzed. While these are the two most broadly used groups of medicines in terms of the proportion of the provincial population receiving treatment, access to other categories of medicine may have responded differently to the policy change. This might be particularly true of drugs used by vulnerable populations (Tamblyn et al. 2001). Secondly, our analyses were not linked to health services utilization as a measure of policy impact. Thus, if the policy change improved or limited access to necessary prescription therapies, one might expect changes in the utilization rates of physician or hospital services. Because the drug utilization results presented here indicate that Fair PharmaCare did not significantly alter incidence or discontinuation of the studied drug classes, further investigation of the health system impact was not warranted. However, medical and hospital records will be essential to further research aimed at determining whether Fair PharmaCare differentially affected patients of equal income but different levels of medical need or frailty. Finally, our measure of discontinuations was based on the assumption that a gap between prescriptions of over 120 days is a reasonable measure of treatment discontinuation or interruption. This measure, while sensitive enough to detect major policy impacts (of which we found none), does not account for patient stockpiling of medicines in light of anticipated user charges or existing deductibles.

Correspondence may be directed to: Steve Morgan, Assistant Professor, Health Care and Epidemiology and Research Lead, Program in Pharmaceutical Policy, Centre for Health Services and Policy Research, University of British Columbia, 429 – 2194 Health Sciences Mall, Vancouver, BC V6T 1Z3; tel.: 604-822-7012; fax: 604-822-5690; email: morgan@chspr.ubc.ca.
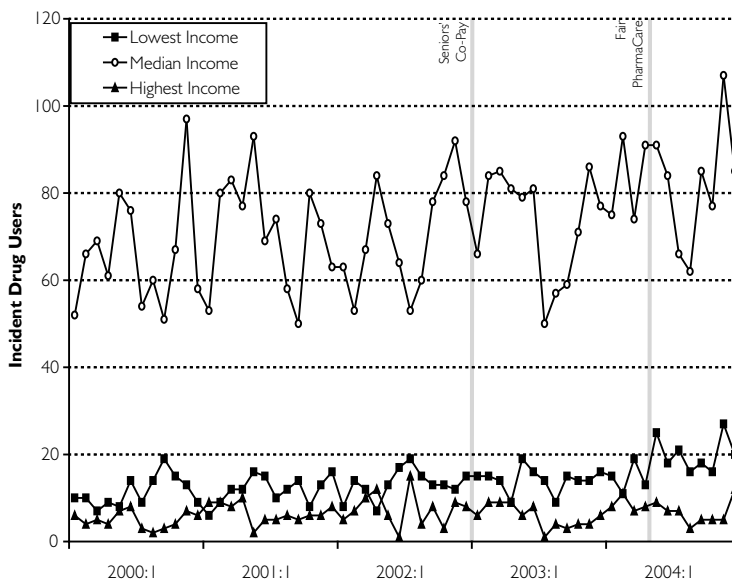
Appendix 1

FIGURE A1. Incident users of hypertension drugs, seniors, by income and household size

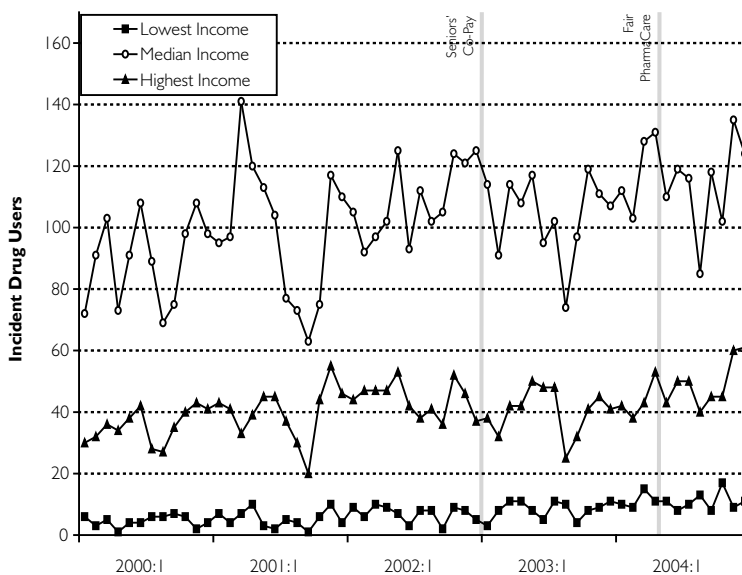A: Single-person households
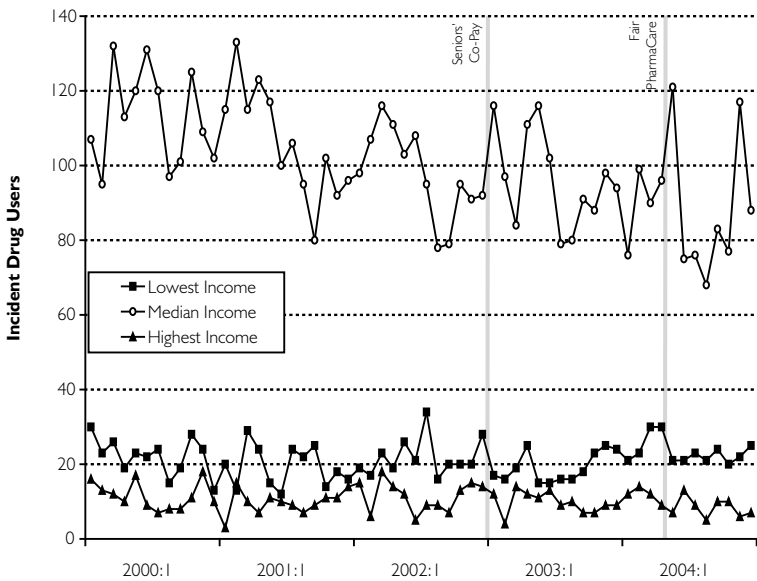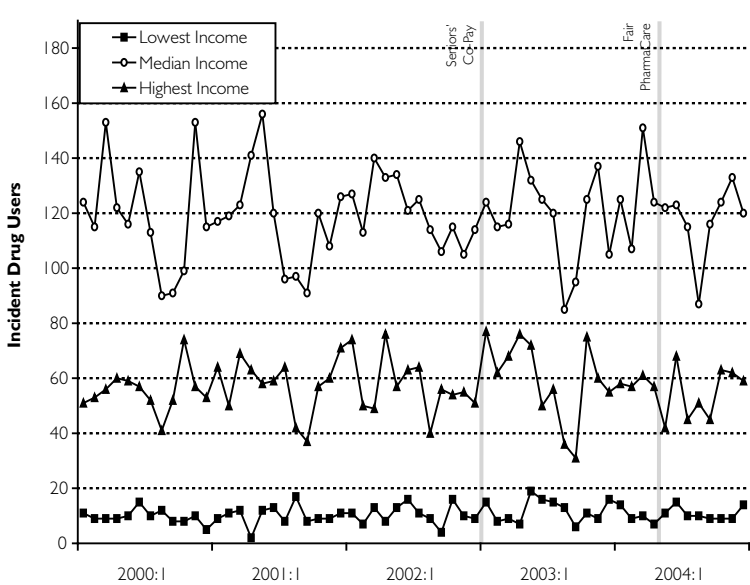

B: Multi-person households

FIGURE A2. Incident users of statins, seniors, by income and household size

A: Single-person households

B: Multi-person households

NOTES

1. These requirements were imposed in order that, if significant utilization changes were detected, analyses could use prior hospitalizations and medical records to adjust for co-morbidities that

may have affected health outcomes. Different lengths of medical history were accommodated because of the different clinical indications for these drugs.

REFERENCES

Caro, J.J., M. Salas, J.L. Speckman, G. Raggio and J.D. Jackson. 1999. "Persistence with Treatment for Hypertension in Actual Practice." *Canadian Medical Association Journal* 160(1): 31–37.

Genest, J., J. Frohlich, G. Fodor and R. McPherson. 2003. "Recommendations for the Management of Dyslipidemia and the Prevention of Cardiovascular Disease: Summary of the 2003 Update." *Canadian Medical Association Journal* 169(9): 921–24.

Hanley, G.E., S. Morgan and L. Yan. 2006. "Income-Based Drug Coverage in British Columbia: The Impact on the Distribution of Financial Burden." *Healthcare Policy* 2(2). <http://www. longwoods.com/product.php?productid=18514&cat=458>.

Jackevicius, C.A., M. Mamdani and J.V. Tu. 2002. "Adherence with Statin Therapy in Elderly Patients with and without Acute Coronary Syndromes." *Journal of the American Medical Association* 288(4): 462–67.

Khan, N.A., F.A. McAlister, R.Z. Lewanczuk, R.M. Touyz, R. Padwal, S.W. Rabkin, L.A. Leiter, M. Lebel, C. Herbert, E.L. Schiffrin, R.J. Herman, P. Hamet, G. Fodor, G. Carruthers, B. Culleton, J. DeChamplain, G. Pylypchuk, A.G. Logan, N. Gledhill, R. Petrella, N.R. Campbell, M. Arnold, G. Moe, M.D. Hill, C. Jones, P. Larochelle, R.I. Ogilvie, S. Tobe, R. Houlden, E. Burgess and R.D. Feldman. 2005. "The 2005 Canadian Hypertension Education Program Recommendations for the Management of Hypertension: Part II – Therapy." *Canadian Journal of Cardiology* 21(8): 657–72.

Morgan, S. and M. Coombes. 2006. "Income-Based Drug Coverage in British Columbia: Towards an Understanding of the Policy." *Healthcare Policy* 2(2): 92–108

Morgan, S., R.G. Evans, G.E. Hanley, P.A. Caetano and C. Black. 2006. "Income-Based Drug Coverage in British Columbia: Lessons for BC and the Rest of Canada." *Healthcare Policy* 2(2): 115–27.

Morgan, S. and L. Yan. 2004. "Persistence with Hypertension Treatment among Community-Dwelling BC Seniors." *Canadian Journal of Clinical Pharmacology* 11(2): e267–73.

Morgan, S. and L. Yan. 2006. "Income-Based Drug Coverage in British Columbia: The Impact on Private and Public Expenditures." *Healthcare Policy* 2(2). <http://www.longwoods.com/product. php?productid=18512&cat=458>.

Schneeweiss, S., S.B. Soumerai, R.J. Glynn, M. Maclure, C. Dormuth and A.M. Walker. 2002a. "Impact of Reference-Based Pricing for Angiotensin-Converting Enzyme Inhibitors on Drug Utilization." *Canadian Medical Association Journal* 166(6): 737–45.

Schneeweiss, S., A.M. Walker, R.J. Glynn, M. Maclure, C. Dormuth and S.B. Soumerai. 2002b. "Outcomes of Reference Pricing for Angiotensin-Converting-Enzyme Inhibitors." *New England Journal of Medicine* 346(11): 822–29.

Tamblyn, R. 2001. "The Impact of Pharmacotherapy Policy: A Case Study." *Canadian Journal of Clinical Pharmacology* 8(Suppl. A): 39A–44A.

Tamblyn, R., R. Laprise, J.A. Hanley, M. Abrahamowicz, S. Scott, N. Mayo, J. Hurley, R. Grad, E. Latimer, R. Perreault, P. McLeod, A. Huang, P. Larochelle and L. Mallet. 2001. "Adverse Events Associated with Prescription Drug Cost-Sharing among Poor and Elderly Persons." *Journal of the American Medical Association* 285(4): 421–29.